

REMARKS

Claims 1-14 are pending.

Claim 1 has been amended to be in better form. Additionally, claim 1 has been amended to recite that a computer is utilized to generate mask images to attenuate a visual noticeability of boundary areas. The paragraph bridging pages 13-14 of the specification discloses optical building processes to prevent boundary areas from becoming noticeable to thereby obtain superior appearance. Additionally, prevention of lines, streaks, and ridges is also disclosed. Thus, one of ordinary skill in the art would readily recognize that the specification discloses the attenuation of the visual noticeability of the boundary areas. At least several other parts of the specification also support this proposition. The use of a computer to achieve this result is disclosed at pages 38-42, where it is disclosed that methods (i), (ii), and (iii) can be achieved with a computer. The term “unnoticeable has been removed from claim 1. Claim 2 has been amended to be consistent with claim 1 and to be in better form. Claim 3 has been amended to be in better form.

Claim 5 has been amended to be in better form and to remove the language of “moving means for,” “means for” with respect to continuously changing the mask image, and “means for making unnoticeable.” Support such amendment is found in claim 5. Claim 5 has also been amended to recite using a computer to attenuate a visual noticeability of boundary areas and is supported for at least the same reasons as claim 1. Claim 5 has also been amended to recite a computer with information for continuously changing the mask image in synchronism with movement of the planar plotting mask, as disclosed, for example, at page 64, first full paragraph of the specification. Claim 6 has been amended to be in better form and to be consistent with claim 5. Claims 7-9 are amended to be in better form.

New claims 10-14 have been added. Claims 10 and 14 recite that the boundary areas are unnoticeable to the human eye, which is supported at least by the paragraph bridging pages 10-11 of the specification where it is disclosed that boundary areas are unnoticeable and the three-dimensional object thereby has superior appearance. One of ordinary skill in the art would understand that appearance would be relative to a human eye. New claims 11-13 are supported

by claim 2, as filed. No new matter has been added and Applicant respectfully requests entry of the present Amendment.

Claims 1 and 5-9 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. The Examiner alleges that in claims 1 and 5, the term “unnoticeable” is indefinite. Also, the Examiner alleges that claims 5-9 recite a “means for continuously changing the mask image of the planar plotting mask in synchronism with movement of the planar plotting mask” and a “means for making unnoticeable boundary areas among adjacent plotted areas of optically-cured resin layers within a finally-obtained stereolithographic three-dimensional object” and that these two recitations are means plus function features where the written description fails to disclose the corresponding structure, material, or acts for the claimed functions. Applicant respectfully but strenuously traverses the rejection of claims 1 and 5-9 as indefinite, as explained below.

The Examiner inquires on page 2 of the Office Action whether the term “unnoticeable” is “unnoticeable to the human eye.” The term “unnoticeable” has been removed from claims 1 and 5 and has been added to claims 10 and 14, which recite that the boundaries are unnoticeable to the human eye, as mentioned in the Office Action. It is Applicant’s position that claims 10 and 14 are definite. As for claim 1, instead of using the term “unnoticeable,” the claim now recites that the visual noticeability of the boundary areas is attenuated. It is Applicant’s position that this language is definite since it specifically recites what is occurring.

Regarding claim 5, the “means for” language objected to by the Examiner has been removed. Additionally, the recitation of the use of a computer to perform some of the tasks has been added. It is Applicant’s position that claim 5 is definite. Reconsideration and withdrawal of the indefiniteness rejections are respectfully requested.

Claims 1, 4, 5, and 8 have been rejected under 35 U.S.C. 103(a) as obvious over Japanese Publication No. JP 03-281329 (Kihara). The Examiner alleges that Kihara discloses all the features of claims 1 and 5 except for explicitly teaching performing an optical building operation such that boundary areas become unnoticeable in the final product. The Examiner alleges that Kihara teaches that it is common to slice the 3D object data into a vast number of

matching optical masks to create a smooth curved surface and that it is well known in the art of stereolithography that the boundary layers between adjacent plotting areas are to be made as smooth as possible in order to create a 3D object without any seam lines. Thus, the Examiner concludes that it would have been obvious to perform a building operation such that the boundary areas of adjacent plotted areas are unnoticeable. Applicant respectfully but strenuously traverses the rejection of claims 1, 4, 5, and 8 for the reasons set forth below.

Claims 1 and 5 recite the use of a computer to attenuate the noticeability of the boundary areas among adjacent plotted areas in the optically-cured resin layer. Kihara fails to disclose or suggest such feature. Additionally, the disclosure of using a vast number of matching optical masks in Kihara is done to smooth the outer surface of the pattern, not to attenuate the noticeability of the boundary areas among adjacent plotted areas. Moreover, the description of the vast number of matching optical masks to smooth the curved surface is in the Prior Art section of Kihara and is directed to prior art. The Examiner has not explained how such disclosure also applies to the invention of Kihara. Additionally, the Examiner's assertion that it is well known in the art of stereolithography that the boundary layers between adjacent plotting areas are to be made as smooth as possible is mere conjecture without any evidentiary support. Furthermore, the Examiner's assertion at page 7 of the Office Action that the invention of Kihara would have altered splicing data from the CAD system to account for possibly boundary issues has not been supported by evidence and no explanation has been provided by the Examiner as to how it would attenuate the noticeability of boundary areas among adjacent plotted areas in the optically-cured resin layer.

Accordingly, in view of the above, *prima facie* obviousness over claims 1 and 5 in view of Kihara has not been demonstrated. Claims 4 and 8 depend from claims 1 and 5, respectively, and are patentable at least for the reason that they depend from a patentable base claim. Reconsideration and withdrawal of the rejection of claims 1, 4, 5, and 8 over Kihara is respectfully solicited.

Claims 1 and 5 are rejected under 35 U.S.C. 103(a) as obvious over European Patent Application Publication No. EP 1057615 A2 (Ueno). U.S. Patent No. 6,627,376 is utilized for

citations to Ueno, as indicated in the Office Action. The Examiner alleges that Ueno discloses all of the features of claims 1 and 5 except for explicitly teaching performing an optical building operation such that boundary areas become unnoticeable in the final product. The Examiner alleges that Ueno discloses that the plane-exposed mask will change continuously in response to the stereolithographic data. Additionally, the Examiner alleges that adjacent layers must be kept at different temperatures at the boundaries to create a smooth object and that it is known in the art of stereolithography that the boundary layers between adjacent areas are to be made as smooth as possible. The Examiner thus concludes that it would have been obvious to perform a building operation such that the boundary areas of adjacent plotted areas are unnoticeable. Applicant respectfully but strenuously traverses the rejection of claims 1 and 5 over Ueno.

Claims 1 and 5 recite that the mask image is continuously changed (claim 1) or it is capable of continuous change (claim 5). The Abstract of Ueno specifically discloses that "a mask is formed on a light-transmissible member (glass plate) on the basis of stereolithographic data for one layer of photohardenable resin." Thus, the structure disclosed in Ueno is a mask on a glass plate and there is no disclosure of a mask image on the glass plate changing continuously. In fact, at column 12, lines 53-56, Ueno discloses using toner to apply the mask to the glass plate. The Examiner has not identified any disclosure in Ueno of how to continuously change the image of the toner. Accordingly, claims 1 and 5 are patentable over Ueno at least for this reason.

Additionally, the term of "smooth" at column 8 of Ueno is directed to the manufacturing process. The actual disclosure is "smoothly manufactured" at column 8, line 22. No disclosure is found in Ueno of attenuating the visual noticeability of boundary areas among adjacent plotted areas. Additionally, the statement that it is known in the art of stereolithography to make the boundaries smooth has not been supported with any evidence by the Examiner. Furthermore, the allegation that the apparatus in Ueno has the ability to make boundary areas unnoticeable via intensity control though the shutter system has not been supported with any citation to Ueno that explains whether and how this is done. The Examiner cites to Figs. 17 and 18 for this proposition but has provided no explanation on how this occurs and no explanation has been found by Applicant in the specification of Ueno.

Accordingly, in view of the above, *prima facie* obviousness over claims 1 and 5 in view of Ueno has not been demonstrated. Reconsideration and withdrawal of the rejection of claims 1 and 5 in view of Ueno is respectfully requested.

Claims 2 and 6 are rejected under 35 U.S.C. 103(a) as obvious over Ueno in view of European Patent No. EP 1192041 B1 (Pollack). The Examiner acknowledges that Ueno fails to disclose at least one of the operations (i)-(iii) of claims 2 and 6 and relies on Pollack for this teaching. The Examiner alleges that Pollack discloses adjustment of light intensity via gray-scale exposure and that it would have been obvious that controlling intensity of adjacent boundary areas will lead to improved boundary definition and make the boundary line unnoticeable. Applicant respectfully but strenuously traverses the rejection of claims 2 and 6 over Ueno in view of Pollack for the reasons set forth below.

First, claims 2 and 6 depend from claims 1 and 5, respectively, which are patentable as explained above. The reliance on Pollack by the Examiner does not cure the deficiencies of Ueno discussed above.

Regarding the adjustment of intensity and the high resolution of the display, the Examiner has not explained how this relates to attenuating the visual noticeability of the boundary areas. The Examiner has not demonstrated that the adjustment of intensity in Pollack will result in less noticeability of boundary areas. Similarly, the high resolution of the display has not been linked with the attenuation. Moreover, claims 2 and 6, with regards to the operation dealing with intensity, are directed to the total intensity of light radiated onto boundary areas among adjacent plotted areas being equal or analogous to the intensity of light radiated onto areas other than the boundary areas. No such disclosure is found in Pollack. Just because Pollack may disclose adjustment of intensity does not mean that there is disclosure of the adjustment of intensity as recited in claims 2 and 6.

Accordingly, at least for the above reasons, claims 2 and 6 are patentable over Ueno in view of Pollack. Reconsideration and withdrawal of the rejection claims 2 and 6 over Ueno in view of Pollack are respectfully solicited.

Claims 3-4 and 7-8 are rejected under 35 U.S.C. 103(a) as obvious over Ueno in view of Pollack and further view of U.S. Patent No. 6,461,797 (Lercel). Claim 9 is rejected under 35 U.S.C. 103(a) as obvious over Ueno in view of U.S. Patent No. 3,718,396 (Hennings).

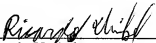
Claims 3-4 and 7-9 depend from either claim 1 or 5 and are therefore patentable at least for the reason that they depend from a patentable base claim. Reconsideration and withdrawal of the rejection of claims 3-4 and 7-8 over Ueno in view of Pollack and Lercel and the rejection of claim 9 over Ueno in view of Hennings are respectfully solicited.

CONCLUSION

In view of the foregoing Amendments and Remarks, Applicants respectfully submit that the claims are in proper form and distinguish over the cited art. Therefore, the present application is in condition for allowance. Reconsideration and an early Notice of Allowance are respectfully requested

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Respectfully submitted,

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